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CLAIMS

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[Claim(s)]

[Claim 1]After making a skin material which has a decoration layer on the surface intervene and carrying out a mold clamp between metallic molds of a right-and-left couple which counters, or an up-and-down couple, injection fill of the melting resin used as a core material is carried out into metallic mold cavity space formed with this skin material and these both metallic molds, In a skin material insert molding method which carries out integral moulding, this skin material and this core material a decoration layer of a skin material, The melting point is higher than the melting point of a core material, and a glass transition point selects construction material lower than the melting point of a core material, Injection filling conditions which carry out injection fill of the resin amount which computed a cooling solidification shrinkage amount of core material resin beforehand, and added a computed shrinkage amount into metallic mold cavity space as an amount of injection fill of core material resin, The 1st amount value of die opening under injection fill, and the 2nd amount value of die opening equivalent to thickness of a skin material containing the amount of decoration, A clamping pressure value aiming at size enlargement load of core material resin with which it filled up in metallic mold cavity space, The 1st switching timing condition changed from a die opening state of the 1st amount value of die opening to a mold clamping state of a clamping pressure value, After initializing the 2nd switching timing condition that changes from a mold clamping state of a clamping pressure value to a die opening state of the 2nd amount value of die opening as a process condition value, try and strike, perform a visual external appearance quality decision by shaping and an operator, and when a process condition needs to be changed, based on a visual external appearance quality decision result, A process condition setting method of skin material insert molding setting up optimum molding conditions which amend each process condition and prevent damage to a skin material decoration layer under shaping using a correcting program prepared beforehand.

[Claim 2]A process condition setting method of the skin material insert molding according to claim 1 which the 1st switching timing condition considered as an injection fill completion time of core material resin.

[Claim 3]preset temperature which set up the 2nd switching timing condition beforehand in a temperature range which shows rubber-like elasticity between a glass transition point of a skin material decoration layer, and the melting point -- skin material decoration -- layer temperature -- a process condition setting method of the skin material insert molding according to claim 1 considered as a time of a degree or core material resin

temperature reaching.

[Claim 4]the 2nd switching timing condition -- skin material decoration -- layer temperature -- a time of a degree or core material resin temperature reaching preset temperature set up beforehand, A process condition setting method of claim 1 initialized by a timeout signal of a timer started when the 1st switching timing condition is satisfied to the skin material insert molding according to claim 3.

[Claim 5]When reaching a marginal adjusted value which a preset value after correction both set up beforehand as it is characterized by comprising the following. A process condition setting method of claim 1 which gave a function to give operator command which changes shaping incidental conditions which consist of a die temperature and core material resin temperature to an injection-molding device to the skin material insert molding according to claim 4.  
inside of each process condition value which a correcting program initialized based on a correcting direction and a correction amount which were set up beforehand corresponding to a quality fault item and a quality fault grade which were acquired by a visual external appearance quality decision result of an operator -- correction -- a function which chooses a required item.

A function to correct a preset value of a selected setting-out item.

[Claim 6]After making a skin material which has a decoration layer placed between the surfaces and carrying out a mold clamp between metallic molds of a right-and-left couple characterized by comprising the following which counters, or an up-and-down couple, A skin material insert molding apparatus which carries out injection fill of the melting resin used as a core material, and carries out integral moulding of this skin material and this core material into metallic mold cavity space formed with this skin material and these both metallic molds.

Injection filling conditions which carry out injection fill of the resin amount adding a cooling solidification shrinkage amount of core material resin into metallic mold cavity space as an amount of injection fill of core material resin.

The 1st amount value of die opening under injection fill.

The 2nd amount value of die opening equivalent to thickness of a skin material containing a decoration layer.

A clamping pressure value aiming at size enlargement load of core material resin with which it filled up in metallic mold cavity space.

The 1st change timing condition changed from a die opening state of the 1st amount value of die opening to a mold clamping state of a clamping pressure value.

An initial setting input part which initializes the 2nd switching timing condition changed from a mold clamping state of a clamping pressure value to a mold clamping state of the 2nd amount value of mold clamps as a process condition value, and is inputted.

A molding equipment control section which carries out drive controlling of the injection-molding device which performs skin material insert molding based on a preset value of an initial setting input part, A correcting program storage which stores a correcting program which sets up optimum molding conditions which correct each process condition preset value initialized based on an input value of a quality determining input part which inputs a visual external appearance quality decision result, and a quality determining input part, and prevent damage to a skin material decoration layer under

shaping.

[Claim 7] With a temperature detecting element which detects skin material decoration temperature or core material resin temperature under shaping, and preset temperature set as an initial setting input part in a temperature range which shows rubber-like elasticity between a glass transition point of a skin material decoration layer, and the melting point. A process condition setting device of the skin material insert molding according to claim 6 which gave a function to initialize operator command of the 2nd switching timing condition, and to input.

[Claim 8] A timer started when the 1st switching timing condition is satisfied, To an initial setting input part. A process condition setting device of the skin material insert molding according to claim 6 which gave a function to initialize and input operator command of the 2nd switching timing condition by a timeout signal of a timer with preset temperature set up in a temperature range which shows rubber-like elasticity between a glass transition point of a skin material decoration layer, and the melting point.

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### DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the process condition setting method and device of skin material insert molding which obtain the mold goods which carried out the weld unification of the decoration nature skin material which has a decoration layer on the surface of a core material simultaneously with the size enlargement of a core material.

[0002]

[Description of the Prior Art] The resin molding part article used for a car, a household appliance, building materials, etc. adds values, such as cushioning properties, fanciness, and a feeling of a feel, or in recent years. Or two-layer shaping which carries out integral moulding of the decoration \*\*\*\*\* skin materials, such as a nap-raising nature skin material, to the surface of core layer resin as shown below, for example was carried out for the cost cut by the process saving of a forming cycle. namely [0003]\*\* When carrying

out using an injection molding machine, set and carry out mold closure of the skin material among both the metallic molds by which die opening was carried out, perform a mold clamp, and carry out injection fill of the melting resin used as a core material after that into the metallic mold cavity formed with the skin material and the metallic mold. And dwelling supply is performed using an injection unit, die opening of the prescribed period cooling is performed and carried out, and product extraction is performed.

[0004]\*\* Set a skin material among both the metallic molds that are performed using a press-forming machine and by which method die opening was carried out, and both metallic molds have been held in the predetermined amount of die opening. In the space formed with a skin material and a metallic mold, after carrying out injection fill of the melting resin used as a core material, the mold clamp press of both the metallic molds is carried out, after that, die opening of the prescribed period cooling is performed and carried out, and product extraction is performed.

[0005]

[Problem(s) to be Solved by the Invention]However, there was a problem as shown below in such a conventional method.

(1) Since load of the melting resin of high temperature high pressure is carried out to a skin material and it is continued till core material cooling completion at the time of ejection of a core material, and a mold clamp press, damage to a skin material is intense and invites a quality down and an appearance defect. For example, in the skin material (generally the foaming layer laminates in many cases) which asked for a soft feeling and the surface decoration performance of cushioning properties. Disappearance of the soft feeling by crushing of a foaming layer and cushioning properties takes place, unevenness occurs in an outside skin, in the skin material (a gidding layer is laminated) which asked for the surface decoration performance of a feeling of a feel, and the high grade feeling, disappearance of the aesthetic property (a feeling of a feel and a high grade feeling) by the failure by hair takes place, an appearance defect is caused, and a quality down is carried out.

[0006](2) In order to minimize the skin material damage to under shaping, when the skilled operator has grasped all the factors, setting optimum molding conditions to experience by intuition, and operating is also considered, but since the quality of mold goods is dependent on the level of skill of an operator, it cannot respond in youth's unripe operator. Namely, not only in a \*\* usual process condition setting-out item (an ejection profile / mold clamp profile), It is necessary to grasp enough process condition setting-out items (the insertion method of of the skin material characteristic / core material characteristic / skin material, and change prediction / skin material of a resin flow in the metallic mold cavity by the affinity / die temperature / core material resin temperature / skin material insertion of core material resin, etc. ... many) peculiar to skin material insert molding.

\*\* It is necessary to fully grasp correlation with the quality determining result of mold goods, and the process condition setting-out item (specification of a correction factor, and calculation of a correction amount) of the above-mentioned \*\*. Especially skin material damage prevention and the improvement in core material formativeness are an opposite controlling factor, and the determination is delicate.

\*\* The operator must fully carry out the understanding acquisition of the above-mentioned \*\* and the \*\*, and must carry out the numerical input of the optimum-

molding-conditions value exact on the basis of right judgment.

[0007](3) Although providing an additional measure means in order to cover shortage of the level of skill of an operator is also considered, there is not sufficient effect, and a quality epidermis integrally molded product cannot be obtained by being stabilized by low cost. For example, even if dependent on the restoration processing (compulsory hair lifting work according to a help with a gigging layer skin material) of the fault part after \*\* shaping, a cost hike is caused and the full restore of the original aesthetic property of a skin material is difficult.

\*\* Even if it carries out multilayer processing (measure against a lamination of the protective layer which has a heatproof/resistance to pressure in the core side) of a skin material, a cost hike is caused too and the perfect damage prevention effects, such as causing the fall of the moldability by the increase in thickness of a skin material, cannot be expected.

[0008]

[Means for Solving the Problem]In this invention in order to solve the above technical problems, After making a skin material which has a decoration layer on the surface intervene and carrying out a mold clamp in the 1st invention between metallic molds of a right-and-left couple which counters, or an up-and-down couple, injection fill of the melting resin used as a core material is carried out into metallic mold cavity space formed with this skin material and these both metallic molds, In a skin material insert molding method which carries out integral moulding, this skin material and this core material a decoration layer of a skin material, The melting point is higher than the melting point of a core material, and a glass transition point selects construction material lower than the melting point of a core material, Injection filling conditions which carry out injection fill of the resin amount which computed a cooling solidification shrinkage amount of core material resin beforehand, and added a computed shrinkage amount into metallic mold cavity space as an amount of injection fill of core material resin, The 1st amount value of die opening under injection fill, and the 2nd amount value of die opening equivalent to thickness of a skin material containing the amount of decoration, A clamping pressure value aiming at size enlargement load of core material resin with which it filled up in metallic mold cavity space, The 1st switching timing condition changed from a die opening state of the amount value of die opening of the 1st amount value of die opening to a mold clamping state of a clamping pressure value, After initializing the 2nd switching timing condition that changes from a mold clamping state of a clamping pressure value to a die opening state of the 2nd amount value of die opening as a process condition value, try and strike and a visual external appearance quality decision by shaping and an operator is performed, Based on a visual external appearance quality decision result, when a process condition needed to be changed, optimum molding conditions which amend each process condition and prevent damage to a skin material decoration layer under shaping were set up using a correcting program prepared beforehand.

[0009]In the 2nd invention, the 1st switching timing condition was considered as an injection fill completion time of core material resin in the 1st invention.

[0010]preset temperature which set up the 2nd switching timing condition beforehand in the 1st invention in the 3rd invention in a temperature range which shows rubber-like elasticity between a glass transition point of a skin material decoration layer, and the

melting point -- skin material decoration -- layer temperature -- it was considered as a time of a degree or core material resin temperature reaching.

[0011]and -- setting from the 1st invention to the 3rd invention in the 4th invention -- the 2nd switching timing condition -- skin material decoration -- layer temperature -- a time of a degree or core material resin temperature reaching preset temperature set up beforehand was initialized by a timeout signal of a timer started when the 1st switching timing condition is satisfied.

[0012]In the 5th invention, from the 1st invention, in the 4th invention a correcting program, It corresponds to a quality fault item and a quality fault grade which were acquired by a visual external appearance quality decision result of an operator, inside of each process condition value initialized based on a correcting direction and a correction amount which were set up beforehand -- correction, while having a function which chooses a required item, and a function to correct a preset value of a selected setting-out item, When a preset value after correction reached a marginal adjusted value set up beforehand, a function to give operator command which changes shaping incidental conditions which consist of a die temperature and core material resin temperature to an injection-molding device was given.

[0013]After making a skin material which has a decoration layer placed between the surfaces and carrying out a mold clamp in the 6th invention between metallic molds of a right-and-left couple which counters, or an up-and-down couple, A skin material insert molding apparatus which carries out injection fill of the melting resin used as a core material, and carries out integral moulding of this skin material and this core material into metallic mold cavity space formed with this skin material and these both metallic molds is provided with the following.

Injection filling conditions which carry out injection fill of the resin amount adding a cooling solidification shrinkage amount of core material resin into metallic mold cavity space as an amount of injection fill of core material resin.

The 1st amount value of die opening under injection fill.

The 2nd amount value of die opening equivalent to thickness of a skin material containing a decoration layer.

A clamping pressure value aiming at size enlargement load of core material resin with which it filled up in metallic mold cavity space, The 1st switching timing condition changed from a die opening state of the 1st amount value of die opening to a mold clamping state of a clamping pressure value, An initial setting input part which initializes the 2nd switching timing condition changed from a mold clamping state of a clamping pressure value to a die opening state of the 2nd amount value of die opening as a process condition value, and is inputted, A molding equipment control section which carries out drive controlling of the injection-molding device which performs skin material insert molding based on a preset value of an initial setting input part, A correcting program storage which stores a correcting program which sets up optimum molding conditions which correct each process condition preset value initialized based on an input value of a quality determining input part which inputs a visual external appearance quality decision result, and a quality determining input part, and prevent damage to a skin material decoration layer under shaping.

[0014]A temperature detecting element which detects skin material decoration

temperature or core material resin temperature under shaping in the 6th invention in the 7th invention, A function to initialize operator command of the 2nd switching timing condition, and to input with preset temperature set as an initial setting input part in a temperature range which shows rubber-like elasticity between a glass transition point of a skin material decoration layer and the melting point was given.

[0015] A timer started in the 6th invention in the 8th invention when the 1st switching timing condition is satisfied, A function to initialize and input operator command of the 2nd switching timing condition by a timeout signal of a timer with preset temperature set as an initial setting input part in a temperature range which shows rubber-like elasticity between a glass transition point of a skin material decoration layer and the melting point was given.

[0016]

[Embodiment of the Invention] The following desirable shaping is carried out by carrying out the above the 1st - the 8th invention.

\*\* An operator carries out outline setting out of the process condition preset value, and inputs it into a skin material insert molding apparatus (initial setting), and it tries, and strikes, and shaping is performed. An operator carries out a visual external appearance quality decision for the obtained mold goods, and a decision result is inputted into a skin material insert molding apparatus (quality determining). According to the inputted quality determining result, a skin material insert molding apparatus determines automatically the selection and the correction amount of a preset value which should be corrected among the initialized values inputted previously by a correcting program (automatic correction), and obtains normal mold goods with the corrected process condition preset value. For this reason, optimum-molding-conditions setting out is easily attained also with the operator which is not high as for the level of skill.

[0017]\*\* Where die opening maintenance is carried out, carry out core material resin injection restoration (a cooling solidification shrinkage amount is added). Mold locking force is made to pay simultaneously with the completion of restoration (the 1st switching timing condition), and mold clamp dwelling is performed. When a skin material decoration layer reaches the preset value in the temperature range which shows the rubber-like elasticity of a skin material decoration layer in a mold clamp dwelling process (the melting point  $T_m$  - glass transition point  $T_g$ ) at core material resin temperature (temperature control or timer control, the 2nd switching timing condition), While carrying out a control change from clamping pressure to a mold clamp position, a mold clamp dwelling process performs size enlargement of a core material a predetermined set period and by carrying out die opening maintenance with the predetermined amount value of die opening, and recovery by the elastic force of the skin material which received damage during shaping by the die opening dwelling process is performed. As a result, it becomes possible to control simultaneously exactly the controlling factor with which a core material formativeness rise and skin material damage prevention disagree.

[0018]\*\* By a correcting program (invitation-for-amendment grant function to the incidental facilities at the time of exceeding the repair capability and correction full limits of an initialized value according to the quality determining result of an operator). Automatic correction-ization is attained while quantifying exactly correlation with the usual process condition setting-out item, a process condition item peculiar to skin material insert molding, and a quality determining result. Thereby, it is right and

correction of each process condition preset value of initial setting can be enabled.

[0019]\*\* By having given the function which the optimal condition setting-out work of the above-mentioned \*\* - \*\* can carry out automatically to molding equipment, automatic operation of optimal condition setting out of skin material insert molding is attained.

[0020]\*\* It becomes possible about automatic operation of the optimum molding conditions stabilized without being influenced by the disturbance factor under shaping by giving the function to detect the skin material decoration layer or core material resin temperature under shaping to molding equipment, and the function in which temperature setting of the 2nd switching timing condition is carried out, and it can be inputted.

[0021]\*\* Low cost-ization of automatic operation of stable optimum molding conditions is enabled by giving the function in which it can set up and input again by the timeout signal of the timer which starts the 2nd switching timing condition by the 1st switching timing condition formation to molding equipment.

[0022]

[Example]Based on a drawing, the details of the example of this invention are explained below. The entire configuration figure of the skin material insert molding apparatus which drawing 1 and drawing 2 require for the example of this invention, and uses drawing 1 for this invention, It is a correlation diagram with the time of recovery of skin material decoration temperature [ in / drawing 2 can be set to the process flow chart of the process condition setting method of the skin material insert molding of this invention, and / in drawing 3 / a skin material insert molding process ], core-material-resin deformation, and a decoration layer.

[0023]As shown in drawing 1, the injection-molding device (injection molding machine) 100 in this invention comprises the metallic mold device 10, the mold clamp device 20, the ejection device 30, and the control device 60. The metallic mold device 10 consists of the fixed mold 3 attached to the stationary platen 1, and the movable die 4 attached to the movable head 2, and the movable head 2 and the movable die 4 are constituted so that it can \*\* in the mold clamping cylinder 22 of the mold clamp device 20 approximately. The mold clamp device 20 is provided with the mold clamping cylinder 22 which operates the die opening of both the metallic molds 3 and 4 of the metallic mold device 10, and mold closure.

The movable die 4 is guided in Tiber which is not illustrated to the fixed mold 3, and \*\* approximately.

[0024]The screw 34 which equipped the periphery in the barrel 32 with the screw blade 36 attached to spiral shape can rotate the ejection device 30 freely by the right inversion hydraulic motor 42 and the injection cylinder 40, And it is allocated free [ order \*\* ], and melting resin is ejected via the nozzle 39 into the metallic mold cavity 5 formed between the metallic molds 3 and 4, carrying out heat melting of the resin pellet supplied to the hopper 38, and kneading it. That is, the ejection device 30 is constituted so that heating compression may be carried out in the supplying zone in the barrel 32, and a compression zone, melting measuring may be carried out in a measuring zone and the resin raw materials in the hopper 38 may be ejected into the metallic mold cavity 5 via the nozzle 39 through an ejection zone. It supplies and drives by the fixed pressure set to the injection cylinder 40 and the right inversion hydraulic motor 42 by the hydraulic control



valve 52 in which the hydraulic oil supplied by the hydraulic pressure supply source 50 received the operator command of the ejection control section 62.

[0025] On the other hand, the control device 60 comprises the ejection control section 62 and the mold clamp control section 67 which are connected with the molding equipment control section 61 at this, and send operator command to the hydraulic control valve 52, as shown in drawing 1. Furthermore, the temperature detecting element 66 which detects the temperature information measured with the temperature sensor arranged at the initial setting input part 63, the correcting program storage 64, the quality determining input part 65, and the movable die 4 is connected to the molding equipment control section 61. The mold clamp control section 67 gives a manipulate signal to the mold clamping cylinder 22 of the mold clamp device 20 via the hydraulic control valve 69. 70 is a hydraulic pressure supply source. Although the injection molding machine which has a direct pressure-type mold clamp device was used in this example, the injection molding machine which has an injection molding machine of a toggle mold clamp device, an injection molding machine of a vertical type, or an electromotive mold clamp device may be used.

[0026] Drawing 2 is what showed the process flow chart of the process condition setting method of the skin material insert molding of this invention, and performs process condition setting out according to the process shown in drawing 2.

(1) The injection filling conditions which carry out injection fill of the resin amount adding the cooling solidification shrinkage amount of initial-setting \*\* core material resin of a process condition preset value into metallic mold cavity space as an amount of injection fill of core material resin, The initialized value of each preset value, such as the 1st amount value of die opening under injection fill, the 2nd amount value of die opening equivalent to the thickness of the skin material containing a decoration layer, and a clamping pressure value aiming at the size enlargement load of the core material resin with which it filled up in metallic mold cavity space, is carried out. The outline preset value of the commonsense range on operation may be sufficient as these process condition preset values, and they are automatically corrected to optimum molding conditions by the correcting work by the below-mentioned correcting program carried out henceforth. Therefore, in initial setting, the level of skill with special abundant knowledge and experience is unnecessary, and can be set as anyone.

\*\* For example, although the 1st amount of die opening can avoid the direct collision to the skin material of core material melting resin near the gate section at the time of ejection (skin material damage prevention near the gate section), Although the amount of proper die opening changes with gate shape, core material radiation conditions, etc., it is confirmed in an experiment about, for example, the effect of the skin material damage prevention near the gate section being enough acquired, if there is not less than 20 mm. However, the metallic mold structure where resin does not leak in this case even if a metallic mold opens is required.

[0027] (2) Based on the correction profile which consists of the correcting direction and correction amount which were beforehand set up corresponding to the quality fault item (defective item) and quality fault grade which were acquired by the visual external appearance quality decision result of the correcting program creation \*\* operator, the inside of each initialized process condition value -- correction, while having a function which chooses a required item, and the function to correct the preset value of the selected

setting-out item, When the preset value after correction reaches the marginal adjusted value set up beforehand, the correcting program which gave the function to give the operator command which changes the shaping subsidiary condition which consists of a die temperature and core material resin temperature to an injection-molding device is created, and it inputs into the correcting program storage 64.

[0028](3) trying and striking -- shaping implementation \*\* -- carrying out die opening of both the metallic molds 3 and 4 of the metallic mold device 10, and first, After setting the skin material S to the prescribed position which counters the metallic mold cavity 5 of a mold parting surface and carrying out die opening maintenance with the predetermined amount value of die opening, core material resin is ejected, dwelling (mold-locking-force operation) is performed, die opening of the cooling solidification of core material resin is waited for and carried out, and trial production mold goods are taken out.

\*\* The skin material S is a two-layer sheet in which decoration layers, such as textile fabrics of a synthetic fiber and raising cloth, were formed on the resin sheet surfaces, such as PP (polypropylene) and PE (polyethylene). It is provided in order to form a decoration layer in the mold-goods surface and to attain the weld unification with a core material, but a resin sheet may be omitted. A cushion layer etc. may be provided in a resin sheet rear face if needed. In this example, although the skin material used the sheet shaped thing, the Puri mold goods which carried out outline shaping beforehand at molding shape may be sufficient as it. Any, such as needling, vacuum suction, and core forcing, may be sufficient as a setting method. In order to use an elastic recovery phenomenon, the thing of construction material with the melting point  $T_m$  higher than melting point  $T_m'$  of core material resin and the glass transition point  $T_g$  lower than melting point  $T_m'$  of core material resin is used for a decoration layer. As a concrete example, when PP (talc addition may be sufficient) is used for core material Q, since core material melting point  $T_m'$  is 170-180 \*\*, it adopts PET (melting point  $T_m=230-240$  \*\*, the glass transition point  $T_g = 70-90$  \*\*) as a decoration layer, for example.

[0029](4) Observe the trial production mold goods by the visual external appearance quality decision by an operator, and a decision result of which correcting work \*\* shaping was done, perform quality determining, and input a defective item and a fault grade.

\*\* When it becomes an excellent article suddenly by the visual external appearance quality decision in the first-time trial production mold goods tried and struck, the initialized process condition preset value turns into an optimum-molding-conditions preset value, and complete and setting out shifts to real operation operation immediately.

\*\* When fault (quality is poor) comes out by the visual external appearance quality decision in trial production mold goods, \*\* A process condition preset value is corrected according to the correcting program which already created the fault item and the fault grade of having been inputted, and shaping by the corrected process condition preset value is performed again, and henceforth, it is repeated until a visual external appearance quality decision and correction serve as an excellent article.

[0030]\*\* The feature of the correcting program of this invention is in the place which included the elastic recovery action by the rubber-like elasticity of a skin material decoration layer in the correction profile of the process condition. That is, the skin material decoration layer under shaping is heated in the amount of core-material-resin potential heat by which injection fill was carried out, for example, if core material resin

temperature is 200 °C setting out, it will reach the temperature of 100 °C - 120 °C. In this temperature range, a skin material decoration layer will be in the state of having rubber-like elasticity, and the decoration layer can carry out elastic deformation easily. Therefore, by giving the space (namely, the 2nd amount of die opening that is equivalent to the skin material containing a decoration layer at thickness) which can carry out elastic deformation of the decoration layer in this state, the skin material damaged during shaping (the core material size enlargement which carried out load of the clamping pressure value after core material resin injection restoration especially -- in process) recovers the aesthetic property of a basis, there is no skin material damage, or it will be in very few states, and quality epidermis insert molding can be realized.

[0031]\*\* The skin material damage prevention capability by the elastic recovery in the temperature range which shows the rubber-like elasticity of a decoration layer as shown in drawing 3 based on this idea, i.e., time which recovery takes, The temperature (skin material decoration layer temperature a degree and core material resin temperature) under shaping detected by the temperature detecting element 66 the balance of a cooling solidification state (formativeness/deformation) of core material resin, When the preset temperature set to the correctable glass transition point  $T_g$  between melting point  $T_m$  according to the quality determining result is reached, while removing mold locking force, it controls by [ equivalent to the thickness of the skin material containing a decoration layer ] carrying out die opening maintenance. By carrying out like this, it can attain simultaneously only by temperature controlling while fabricating the opposite technical matter of the skin material damage prevention and the improvement in core-material-resin formativeness which were made very difficult.

[0032]\*\* About the 2nd switching timing setting out, conversion of the timer control from above-mentioned temperature control is also possible again. For example, the skin material decoration layer under shaping and the temperature-change action of core material resin are grasped by measurement test implementation, or it grasps by simulation calculation using flow analysis and a temperature-change analysis program, changes into the function of time, and conditioning is carried out by timer start. By carrying out like this, a controllable rise and ATSUPU of the cost cut by temperature sensor attachment needlessness and maintenance nature are expectable. Even if there is rough setting out in the case of initial setting, it is possible to fully cover with correction of each process condition setting out in accordance with the quality determining depended for trying and striking.

[0033]\*\* Compute correction term eye selection, its correcting direction (increase-and-decrease direction), and correction amount of an initial process condition preset value based on the correcting program mentioned above. For example, to "sheet damage", the preset temperature of the 2nd switching timing condition is corrected to an increasing direction in a fault item, and the rise of bounce-back capability is aimed at. On the other hand, since the degree of cooling solidification of core material resin (formativeness) is downed, correction is aimed at towards increasing mold locking force, and a formativeness down is covered. It corrects in the direction which increases the amount of die opening (the 1st and the 2nd) to this, and while tuning the whole balance finely, minimization of the skin material damage to near [ at the time of ejection ] the gate section and the rise of a recovery space are aimed at.

[0034]\*\* To "barricade generating", correct the amount of injection fill in the reduction

direction, amend injection filling conditions (a pressure, speed, etc.) to this, and tune balance finely.

\*\* To "short-shot generating", correct mold locking force and the amount of injection fill to an increasing direction, amend injection filling conditions (a pressure, speed, etc.) to this, and tune balance finely.

[0035](10) in order for the infinite loop by repetition of correction to carry out condition appearance and to avoid an error, the marginal adjusted value was provided. When a correction amount reaches a marginal adjusted value, reduction (reduction of a process condition setting range) of the available rubber-like elasticity temperature range by the underheat of a decoration layer can be considered to a sake too low [ die-temperature setting out or core material resin temperature setting out ], for example. In this case, correction of the shaping subsidiary condition preset value of a die temperature or core material resin temperature is made.

(11) In this way in the correcting program of this invention. A fixed quantity of correlation of the correction pattern of a preset value is turned into a quality determining result and a defective item, the program ming which realizes both the skin material recovery of damage and core-material-resin formativeness is created, and optimum-molding-conditions setting out can attain now easily regardless of the operator level of skill.

[0036]

[Effect of the Invention]As stated above, according to the method of this invention, the following outstanding effects are attained. That is, setting out of the optimum molding conditions which can lessen damage to the skin material under shaping extremely regardless of the level of skill of \*\* operator becomes possible easily.

\*\* By achievement of the automation by programming, calculation and setting out of optimum molding conditions cancel the individual difference of operator skill, and uniform stabilization of quality realizes it.

\*\* The restoration post process and skin material multilayering processing by skin material damage are unnecessary, and can supply adequately the skin material insert molded part which has the quality appearance capacity which maintained the original aesthetic property of the skin material by low cost.

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[Translation done.]